

dan, French Somaliland, and Uganda. It has 14 to 20 teeth in the buccal cavity and a rather narrow pharynx with relatively coarse teeth in the female. The specimens from the Yemen agree well with the description of the species. There are about 20 teeth in the buccal cavity of the female.

Sergentomyia schwetzi Adler, Theodor, and Parrot, 1929

2 ♀ ♀, 1 ♂ coll. 306, from rodent burrows.

Group *africana*

Sergentomyia africana Newstead, 1912

3 ♀ ♀ coll. 306, from rodent burrows.

Kirk and Lewis (1951) propose to change the name of the species to *S. freetownensis*. This change, however, requires a ruling of the International Commission for Zoological Nomenclature, suppressing the name *S. africana*. The old name is therefore retained until the nomenclatorial position is clarified.

Subgenus *Sintonius* Nitzulescu, 1931

Sergentomyia tiberiadis Adler and Theodor, 1930

Syn. *S. subtilis* Parrot and Martin, 1944

6 ♂ ♂, 1 ♀ Ta'izz, coll. 304/307; 1 ♂ coll. 309, El-Hauban.

The species was recorded from Abyssinia by Parrot in 1936 as *P. tiberiadis*. Later Parrot described the male of the species as *P. subtilis*, and in 1940 Parrot redescribed both sexes under

the name *P. subtilis*. Comparison of the type specimens of *P. tiberiadis* from Palestine with specimens of Parrot's original series, with specimens from the Sudan, and with the specimens from the Yemen showed that there are practically no constant differences between the material from the different localities. The characters on the basis of which Parrot separated *S. subtilis* from *S. tiberiadis* are so small and variable that they do not justify the retention of *S. subtilis* as a separate species.

The *Phlebotomus* fauna of the Yemen is thus, as was to be expected, mainly Ethiopian in character. Seven out of the 9 species recorded occur in Abyssinia and the Anglo-Egyptian Sudan. Only one Mediterranean species, *P. sergenti*, and a new subspecies of *P. chinensis* were found, the various forms of which are widely distributed in Asia and the eastern Mediterranean.

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- BIOLOGY.**—*New records of Diaptomus sanguineus and allied species from Louisiana, with the description of a new species (Crustacea: Copepoda)*. MILDRED STRATTON WILSON, Arctic Health Research Center, U. S. Public Health Service, Anchorage, Alaska, and WALTER G. MOORE, Loyola University, New Orleans, La.
- Marsh's record of the occurrence in Louisiana of the fresh-water copepod *Diaptomus sanguineus* Forbes appears to be based upon personal correspondence with Edward Foster (see Marsh, 1929, pp. 13, 15, and 17), whose manuscript records were published by Penn (1947). This lists the species as occurring near Slidell, in St. Tammany Parish, rather than near New Orleans as given by Marsh. Collections made in 1951 and 1952 by one of us (Moore) indicate that the species is very common in St. Tammany Parish, where it occurs in seasonal ponds and

ditches, frequently in association with *Diaptomus stagnalis* and *D. conipedatus*. Collections made near Alton and Florenville from January to February 29 contained adults; most females collected on the latter date were ovigerous. The species also has been found in temporary pools and ponds north of Alexandria, Rapides Parish, in the central part of the State. Here most of the specimens found on December 28 were immature; only adults were present in collections made on April 6.

Two species allied to *sanguineus* have

been found in our Louisiana collections. The little-known *Diaptomus virginiensis* and a new species are described below from specimens collected in St. Landry and Evangeline Parishes.

***Diaptomus (Onychodiaptomus) virginiensis*
Marsh**

Figs. 11-12; 21-25

Diaptomus virginiensis Marsh, 1915, p. 457, figs. 1-5; 1929, p. 23.

Specimens examined.—Type lot: from Marsh collection in U. S. National Museum, Marsh nos. 4064, 4067, 4154. Great Falls, Va.

Louisiana: 20 ♀ (4 ovigerous), 1 ♂, ditch pond on U. S. Highway 71, south of Lebeau, St. Landry Parish, April 5, 1951, W. G. Moore; 6 ♀, same location (ditch ponds on opposite sides of highway—4 ♀ in one, 2 ♀ in other), December 27, 1951, W. G. Moore.

The only record of this species in literature is that of the type locality in Virginia. The Louisiana specimens agree very closely with the type material examined, so that there is no doubt of the identity of the species.

The Louisiana specimens are a little larger than those recorded by Marsh: ♀, 1.41-1.61 mm, ♂, 1.3 mm. (Marsh's figures are: ♀, 1.366, ♂, 1.24 mm).

The illustrations given here are all drawn from the Louisiana specimens. There are no differences between the fifth leg of the Louisiana male and the type specimens from Virginia. Such differences as appear when Fig. 22 is compared with Marsh's description and illustration (Marsh, 1915, fig. 5) have not been found to exist in the types. These include the greater length of the spine of the right basipod segment 1, the presence of the small sclerotized lamella of the distal outer portion of basipod 2, the presence of the prominent double-lined ridge of the second exopod segment, and the greater length of the lateral spine, which is placed at the middle of the segment and reaches to or beyond its apex.

The proximal pad of the apical segment of the left exopod does not occupy half of the inner margin as stated by Marsh; he must have included a portion of the distal pad which covers most of the posterior face. The inner process arises near the distal part of this pad (Fig. 23) and forms a pincer with the distal process, as in

sanguineus. The distal process is stout and digitiform, its length a little less than one-half that of the outer margin of the segment (7:16).

Marsh has not described the urosome of the male, which is moderately asymmetrical. Groups of minute spinules such as those found on the dorsal face of the fourth segment in the Louisiana specimen (Fig. 21) are also present in the type material. These have not been found in any other species of the group.

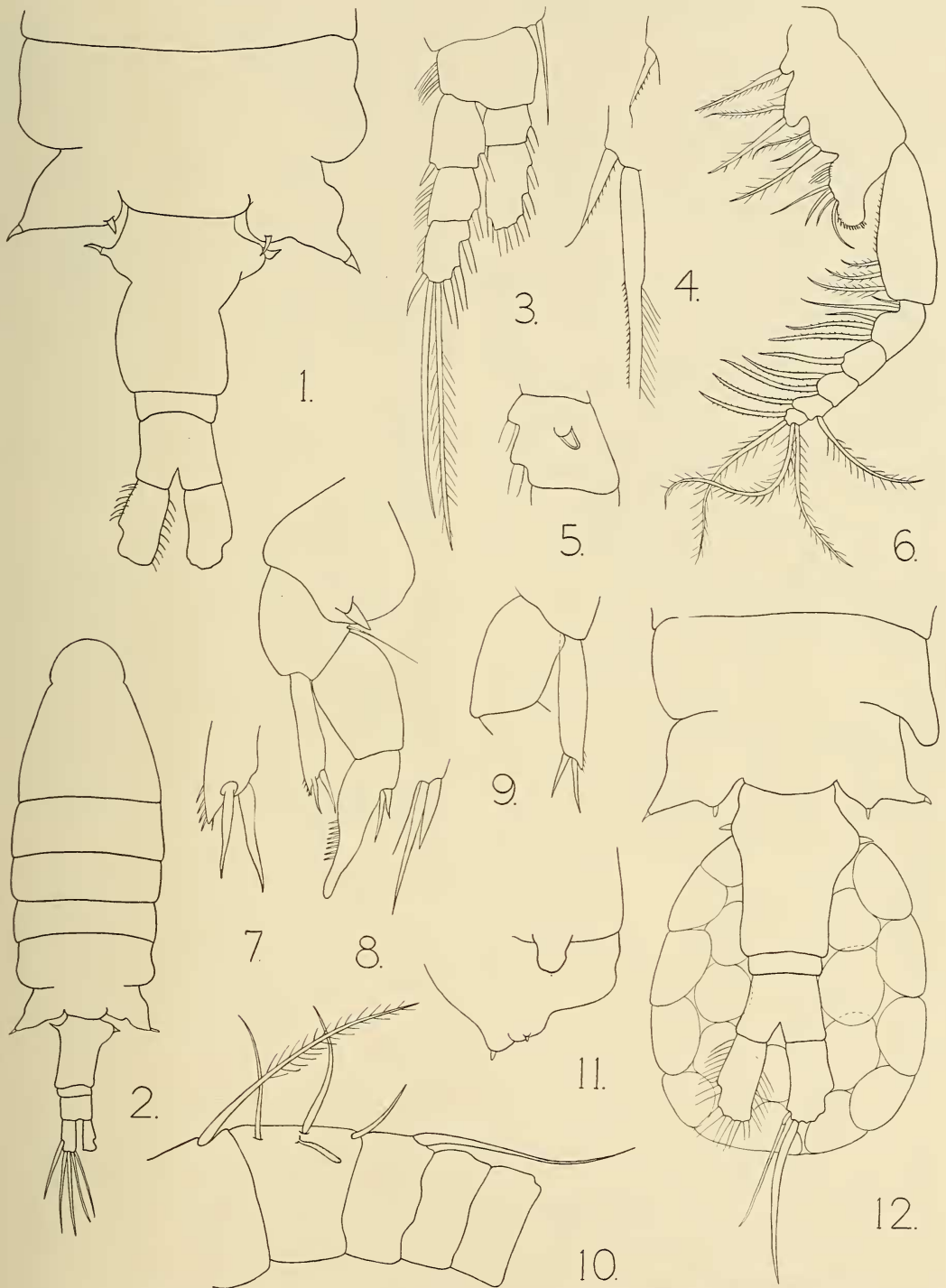
The important characters of the right antennule of the male have not been described. The Louisiana specimen agrees exactly with those of the type lot. The relative development of the spines of segments 10, 11, and 13 are unusual in North American diaptomids (Fig. 25). Those of 10 and 11 are very short, being only a little longer and stouter than the minute spines of segments 8 and 12. That of segment 13 is excessively large, reaching to about the middle of segment 15. The relative lengths of the spines are:

Segment	8	10	11	12	13
Spine	3	4	5	3	46

Segment 15 has a moderately sized spinous process, segment 16 a minute process; both are placed at the middle of the segment. The setation of the left antennule agrees with that of the female.

The females of the Louisiana collection of *virginiensis* have a noticeable backwardly directed lobelike protrusion on the right side of the fifth metasomal segment (Figs. 11 and 12). The wings of the last segment are a little asymmetrical; the left may have the inner lobe well developed as shown in Fig. 12 or the entire margin may be nearly straight. The genital segment of the Louisiana specimens agrees with the type in not having the pronounced asymmetry and great lateral expansion found in the allied species; the lobe of the right side is usually only a little larger than that of the left, and there are no other expansions or modifications.

The antennule is of the "little setaceous" type, with one seta on segments 11 and 13-19. The seta of segment 1 reaches to about the middle of segment 2, and is nonplumose. There is a cuticular lappet on the second segment of the endopod of leg 2. The general aspect of the fifth leg is much like that of the new species described below, from which it usually differs in having the setae of the endopod extremely short.



FIGS. 1-10.—*Diaptomus louisianensis*, n. sp., female: 1, Metasome segments 5-6 and urosome, dorsal; 2, dorsal outline of body; 3, leg 1; 4, leg 1, detail spines of exopod segments 1 and 3; 5, leg 2, endopod segment 2; 6, maxilliped; 7, leg 5, detail endopod setae; 8, leg 5, with detail of setae of exopod 3; 9, leg 5, showing variation in length of endopod; 10, antennule, detail of setae of segments 1-3;

FIGS. 11-12.—*Diaptomus virginiensis* Marsh, female (St. Landry Parish, La.): 11, Metasome segments 5-6, right side, lateral; 12, metasome segments 5-6 and urosome of ovigerous specimen, dorsal.

Diaptomus (*Onychodiaptomus*) *louisianensis*,
n. sp.

Figs. 1-10; 13-20

Specimens examined.—Type lot: 6 ♀, 1 ♂, ditch in Chicot State Park, Evangeline Parish, La., December 27, 1950, W. G. Moore. Holotype ♀ (whole, alcoholic), U. S. N. M. no. 93271.

7 ♂, ditch pond, south of Lebeau, St. Landry Parish, La., April 5, 1951, W. G. Moore.

Female.—Length, about 1.85 mm (metasome, 1.40 mm, urosome, 0.45 mm). Dorsal view: head rounded (Fig. 2), cephalic segment behind antennal area greatly widened, its distal portion and segments 2-4 nearly parallel; the greatest width in segment 2, equaling about 30 per cent of the total body length. Segments 5 and 6 not separated dorsally, the right side of segment 5 differing slightly from the left, having the distal half more rounded. The wings of the last segment well developed (Fig. 1), noticeably asymmetrical, that of the left side without lobes, the posterior margin nearly straight; the right side having a conspicuous lobe on both the outer and inner proximal portion, the tip drawn out to a point.

The urosome 3-segmented (Fig. 1). The genital segment having each side of the proximal portion produced into conspicuous lateral lobes tipped with stout sensory spines, the lobe of the right side larger and more rounded than that of the left. Segment 2 short; segment 3 and the caudal rami subequal in length to one another; both margins of the rami armed with hairs. The inner dorsal seta nearly as long as the inner terminal caudal seta.

Antennules reaching to near the end of the urosome. The seta of segment 1 reaching to a little beyond the middle of segment 3, its tip plumose (Fig. 10); that of segment 3 subequal to that of 1. The numerical setation as in other species of *Onychodiaptomus*: 1 seta on segments 11 and 13-19. The setae of segments 16, 18 and 21 of considerable length and stoutness, all conspicuously plumose; that of 16 reaching to the middle of segment 20; that of 18 to the middle of 22. The short, modified setae of segments 17, 19, 20, 22 not particularly stiff, their tips straight and slender, each longer than or nearly as long as its segment.

The maxilliped (Fig. 6) not stoutly developed; each basal segment and the endopod subequal to one another; the inner setae of the endopod all weakly developed, shorter than the endopod and the terminal and outer setae of the last

two segments, the longest of which are about as long as the endopod itself. The distal lobe of the basal segment conspicuously produced, with four setae. The relative lengths of the setae of the basal segment:

lobe 1	lobe 2	lobe 3	lobe 4
20	17:20	15:10:23	15:9:7:10

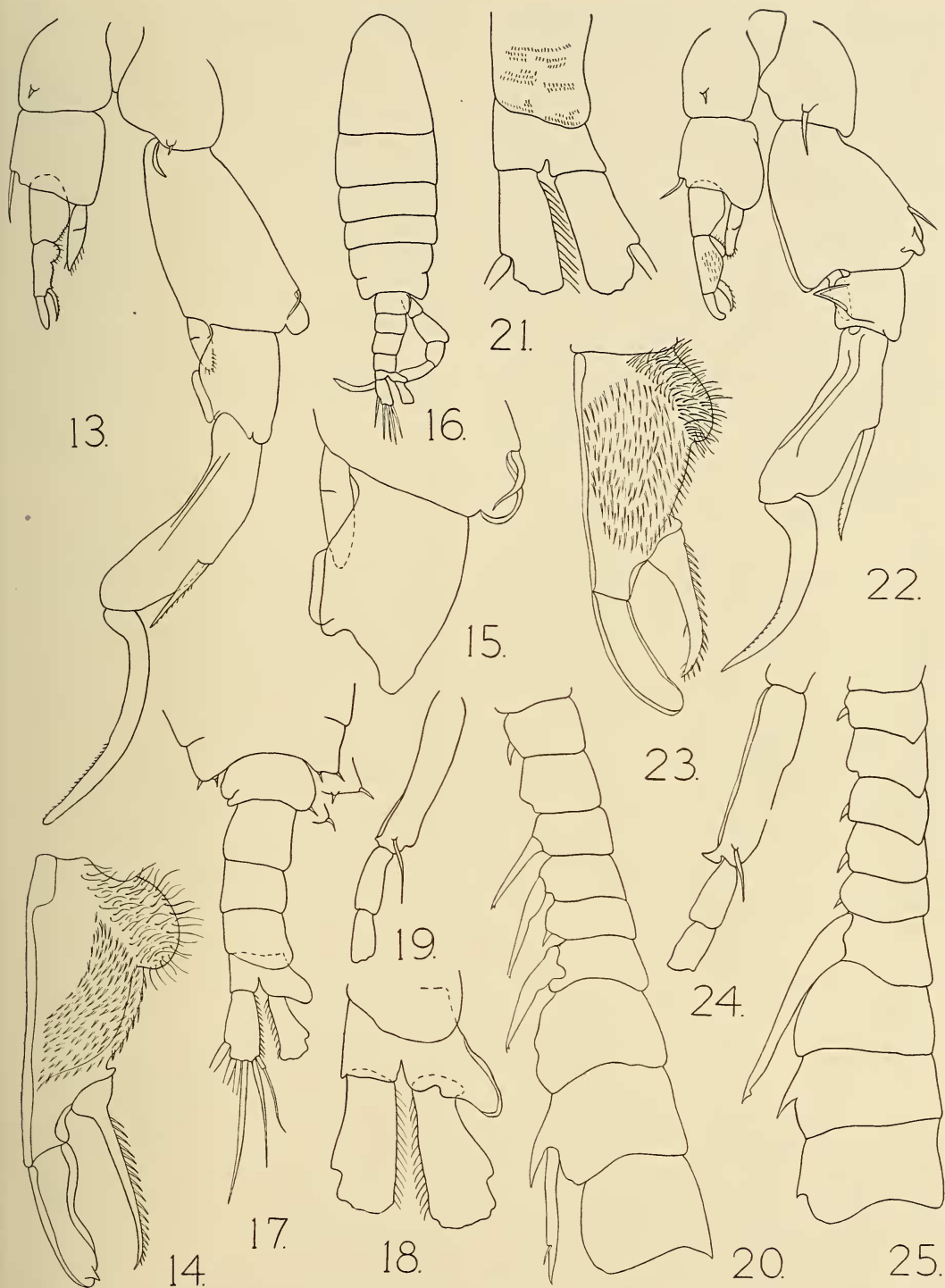
Leg 1 (Fig. 3) having fine, inconspicuous hairs on the outer margins of exopod segments 2 and 3. The outer spines of segments 1 and 3 spiniform (Fig. 4), both relatively weak and short, proportions to one another, 5:7; both with minute marginal serrations and tipped with sensory hairs. The outer terminal modified seta not at all spiniform, longer than the total exopod (50:40), a little weaker and shorter than the other setae of the segment, its outer margin minutely serrate, its inner plumose.

Leg 2 with a cuticular lappet on the second segment of the endopod (Fig. 5).

Leg 5 (Fig. 8) rather stout, the spine of the basal segment large and flat. The first exopod segment broad, greatest width to length of outer margin about 17:30. Exopod 2 longer than exopod 1 (35:30), with long, slender spinules on the inner margin. Outer seta of segment 2 not present. Exopod 3 not developed, its setae present, very closely set; the outer a stout spine, the inner a more slender seta about twice the length of the outer, and reaching to near the middle of exopod 2.

The endopod long, reaching a little beyond (Fig. 8), or considerably beyond the inner margin of exopod 1 (Fig. 9); its inner margin produced to a conspicuous protrusion armed with spinules which continue on to the face of the endopod. The apical setae sinuous (Fig. 7), their bases a little enlarged, one a little stouter than the other; their length usually less than half that of the endopod.

Male.—Length about 1.33 mm. The head rounded as in female, the rest of the metasome not so abruptly widened (Fig. 16). Segments 5 and 6 not separated dorsally, the posterior portions of segment 6 with 2 spines. The genital segment with a slender spine on the right side. The urosome conspicuously asymmetrical in the distal portion (Figs. 17 and 18). Segment 4 considerably produced dorsally on the right side; segment 5 having the right side produced laterally into a large, backwardly directed, marginally sclerotized lobe. The left caudal ramus straight,



FIGS. 13-20.—*Diaptomus louisianensis*, n. sp., male: 13, Leg 5, posterior; 14, leg 5, detail left exopod segment 2, posterior; 15, leg 5, detail distal part of right basipod segment 2 and exopod 1; 16, dorsal outline of body; 17, metasome segments 5-6 and urosome, dorsal; 18, detail of urosome segments 4-5 and caudal rami, dorsal; 19, right antennule, apical segments; 20, right antennule, segments 8-16.

FIGS. 21-25.—*Diaptomus virginienensis* Marsh, male (St. Landry Parish, La.): 21, Detail of urosome segments 4-5 and caudal rami, dorsal; 22, leg 5, posterior; 23, leg 5, detail left exopod segment 2, posterior; 24, right antennule, apical segments; 25, right antennule, segments 8-16.

the right narrowed proximally and widened distally; both rami with inner marginal hairs.

The left antennule with the same setation as in the female; the seta of segment 1 reaching only to the middle of segment 2. The right antennule (Fig. 20) with the spine of segment 8 not enlarged. The spines of segments 10, 11 and 13 all longer than the width of their segments, relative lengths of spines of two specimens: 18:23:24 and 16:21:25. The spine of 13 reaching to about the middle of 14. Segments 14-16 very swollen; segment 15 with a large spinous process arising at the middle and reaching to near the end of the segment; segment 16 lacking a process. The modified setae of 15-17 unusually stout, the tongue-like process very short and not arising close to the end of the seta. The twenty-third segment (Fig. 19) produced to a minute hook-like process, accompanied by a very narrow lamella.

Maxilliped, leg 1 and leg 2 like those of the female.

Leg 5 (Fig. 13) comparatively elongate and slender, the left ramus hardly reaching beyond the basipod of the right ramus. The sensory spines of both basal segments minute. The second basipod segment of the right leg elongate, its distal portion widened, but not conspicuously so, not swollen on the inner side, the outer portion produced into a rounded lobe (Fig. 15); a large, crescent shaped ridge on the inner proximal posterior face. Exopod 1 longer than wide; with a narrow rectangular hyaline lamella on the inner distal margin. The second exopod segment elongate and narrow (length to width 50:15); with an inner marginal ridge. The spine of the outer margin reaching to the apex of the segment, placed below the middle of the segment at about 68 per cent of its total length. The claw thick throughout, subequal in length to the exopod, 52:50. Endopod indistinctly 2-segmented, reaching to the middle of exopod 1.

The second basipod segment of the left ramus about as long as the first, broad throughout. The exopod set deeply into the basal segment, its width greatly reduced. The two segments subequal in length to one another (measuring to the base of the distal process). The apical segment (Fig. 14) having the proximal pad reduced in size, protruding medially but not extending distally to the middle of the segment. The distal pad confined to the posterior face, its medial and distal boundaries outlined below by heavy

TABLE 1.—COMPARISON OF CHARACTERS OF
Diaptomus sanguineus GROUP

Character	<i>sanguineus</i>	<i>virginicensis</i>	<i>louisianensis</i>	<i>hesperus</i>
♀ Melasome				
Segment 5 with right lateral protrusion.....	— ¹	+ ¹	—	—
Segment 6 with elongate spines.....	+	—	—	—
"Wings" strongly asymmetrical.....	—	—	+	—
♀ Urosome				
3-segmented.....	+	+	+	—
Genital segment strongly asymmetrical.....	+	—	+	—
♂ Urosome				
Segment 4 strongly asymmetrical.....	—	—	+	—
Segment 4 with dorsal spinules.....	—	+	—	—
Segment 5 strongly produced, right side.....	—	—	+	+
♂ Right Antennule				
Spines:				
8: enlarged.....	+	—	—	—
10-11: as long as or a little longer than segment width.....	+	—	+	+
13: reaching to end of 14 or beyond.....	—	+	—	—
Processes:				
15: present.....	+	+	+	+
16: present.....	—	+	—	+
♂ Leg 5, right				
Basipod 2 greatly broadened.....	+	+	—	—
Basipod 2 with outer elongate process.....	+	—	—	—
Lamella exopod 1 prominent.....	—	+	—	+
Lamella shape.....	narrow, rounded	triangular	narrow, rectangular	tongue-like
Exopod 2, lateral spine below middle of segment.....	+	—	+	+
♂ Leg 5, left				
Distal pad posterior only (not bulging medially).....	+	+	+	—
Inner process arising below proximal pad.....	—	—	—	+
Inner process reaching to near end of distal (forming pincer).....	+	+	+	—
♀ Leg 5				
Slender (length exopod 1 more than 3 times width).....	—	—	—	+
Inner seta of exopod 3 reaching beyond middle of claw.....	+	—	—	—
Endopod setae more than half length of endopod.....	—	—	—	+

¹ + refers to the presence of a character, — to its absence.

sclerotizations, the short stout hairs recumbent and curving toward the outer margin. The distal process continuous with but clearly demarcated from the segment, its length about one half of the outer margin of the segment, digitiform, curving inwards, the cuticle at its tip notched so as to form a short spinous projection. The inner process arising below the distal pad, its base thickened but otherwise very slender, curving toward and reaching to near the end of the distal process so as to form a pincer; set thickly with spinules on the inner side only; the heavy sclerotized medial portion of the segment produced at its base into a characteristic point.

The endopod reaching to about the middle of exopod 2; indistinctly 2-segmented, its anterior face and medial margins set thickly with stout spinules.

COMPARISON OF SPECIES OF THE SANGUINEUS GROUP

The subgenus *Onychodiaptomus* Light (1939) may be divided by the structure of the male right fifth leg into two convenient taxonomic groups: the *birgei* and the *sanguineus*. In *Diaptomus birgei*, the only known species of its group, the second basipod segment and the exopod, including the claw, differ from the *sanguineus* group, except for the presence of a prominent hyaline lamella on the inner portion of exopod 1. In all other characters, both sexes of *birgei* show unmistakable relationship to the *sanguineus* group. Coker (1926) and Kiefer (1931) have given useful descriptions of *birgei*. The conspicuous ventral lobe found in the female distad to the genital protrusion, is not present in the other species of the subgenus.

The *sanguineus* group includes four species: *D. sanguineus* Forbes, 1876; *D. virginienensis* Marsh, 1915; *D. hesperus* M. S. Wilson and Light, 1951; and *D. louisianensis*, n. sp.

These species agree in the similarity of pattern of the right male fifth leg which is characterized by modification of the second basipod segment and shortness of the claw. The species differ from one another most noticeably in the structure and armature of the second basipod segment and the shape and size of the lamella of exopod 1. There are definable differences in the left exopod. *D. hesperus* is strikingly diverse in that the inner process is so placed that it does not form a pincer with the distal process as in the other species; in this, it is more like *D. birgei*.

Diaptomus sanguineus is a well-defined species; its important diagnostic characters have been reviewed by Humes and Wilson (1951). Louisiana specimens show no significant differences from the Massachusetts specimens studied in that report. The female is easily distinguished from all other North American diaptomids by the unique development of the last metasomal segment, which is not expanded into the usual "wings" but instead has both sensory spines greatly enlarged. Throughout its wide distributional range there is no variation in this character, except for slight differences in the length of the spines. The male is distinguished by the elongation of the usual short spine on segment 8 of the right antennule and by the spiniform elongation of the outer distal corner of the right second basipod segment of the fifth leg. Though variable in length, this process is specifically distinct and differs from the modification or armature found in the other species.

Table 1 gives a summary of the useful taxonomic characters separating the species.

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